



## Research article

[urn:lsid:zoobank.org:pub:778FFF1D-32E1-466B-82DB-BF9B30C2ABE1](http://urn:lsid:zoobank.org:pub:778FFF1D-32E1-466B-82DB-BF9B30C2ABE1)

# Scolopendrellidae (Myriapoda, Symphyla) from the Afrotropics with descriptions of seven new species

Miguel DOMÍNGUEZ CAMACHO<sup>1</sup> & Didier VANDENSPIEGEL<sup>2</sup>

<sup>1</sup> Puenteceñuros 1B, 6C. 28029 Madrid (Spain).

Corresponding author, Email: [miguelcamacho@gmail.com](mailto:miguelcamacho@gmail.com)

<sup>2</sup> Invertebrate Section, Royal Museum for Central Africa. B-3080 Tervuren (Belgium).

Email: [dvdspiegel@africamuseum.be](mailto:dvdspiegel@africamuseum.be)

<sup>1</sup> [urn:lsid:zoobank.org:author:866695CE-585A-4469-B59A-0FFFEFD79683](http://urn:lsid:zoobank.org:author:866695CE-585A-4469-B59A-0FFFEFD79683)

<sup>2</sup> [urn:lsid:zoobank.org:author:CE8C3D01-28AD-43F7-9D4F-04802E68CB1A](http://urn:lsid:zoobank.org:author:CE8C3D01-28AD-43F7-9D4F-04802E68CB1A)

**Abstract.** Among the Scolopendrellidae belonging to the collection of Symphyla of the Royal Museum for Central Africa (Tervuren, Belgium), ten species were found and seven new species are described: *Symphylella erecta* sp. nov., *S. fuko* sp. nov., *S. kalundu* sp. nov., *S. lubumbashi* sp. nov., *S. malagassa* sp. nov., *S. tanganyika* sp. nov. and *Remysymphyla spinosa* sp. nov. SEM micrographs and additional information of the new species and also of *Remysymphyla hova* Aubry & Masson, 1952, *Ribautiella zagnanadina* Brölemann, 1926 and *R. schoutedeni* Hinschberger, 1954 are provided, which contributes to an easier determination of the afrotropical scolopendrellid species. The diagnosis of the genus *Remysymphyla* is discussed.

**Keywords.** Symphyla, Afrotropics, Scolopendrellidae, *Remysymphyla*, *Symphylella*.

Domínguez Camacho M. & Vandenspiegel D. 2012. Scolopendrellidae (Myriapoda, Symphyla) from the afrotropics with descriptions of seven new species. *European Journal of Taxonomy* 32: 1-28. <http://dx.doi.org/10.5852/ejt.2012.32>

## Introduction

Little is known of the Symphyla fauna of the Afrotropics, especially regarding the family Scolopendrellidae. Fourteen species of Scolopendrellidae have previously been reported in the Afrotropics.

The present work is a study of the collection of Symphyla of the Royal Museum for Central Africa (Tervuren, Belgium). The vast majority is unidentified material – nearly 300 tubes containing 1700 specimens in ethanol – from the whole Afrotropics and collected from the 1950s until now. Most specimens belong to family Scutigerellidae, a few of them to Scolopendrellidae.

With the present study, the number of now identified species of Scolopendrellidae from the Afrotropics is significantly increased. The study also presents a synopsis of the Afrotropical species belonging to the studied genera.

## Material and methods

Twenty eight specimens of scolopendrellids were studied using SEM. Specimens preserved in 70% ethanol were dehydrated in a graded series of acetone up to 100%, critical-point-dried with carbon dioxide in a Balzer CPD 030 and subsequently sputter coated with gold. Morphological characters of the specimens were examined under a JEOL JSM–5400LV microscope at 10 kV.

The taxonomic study was completed using identified material of *Ribautiella zagnanadina* Brölemann, 1926 (MRAC 7832) and *Ribautiella schoutedeni* Hinschberger, 1954 (MRAC 7836, 6033), and type specimens of *Remysymphyla hova* Aubry & Masson, 1952b (MNHN K002).

## Abbreviations

|            |   |                                                                     |
|------------|---|---------------------------------------------------------------------|
| A.N.P.     | = | Albert National Park (Democratic Republic of the Congo)             |
| Congo D.R. | = | Democratic Republic of the Congo                                    |
| MNHN       | = | Muséum national d'Histoire naturelle, Paris                         |
| MRAC       | = | Musée Royal de l'Afrique centrale (Royal Museum for Central Africa) |
| SEM        | = | scanning electron microscopy                                        |

## Results

Phylum Arthropoda Latreille, 1829  
Subphylum Myriapoda Latreille, 1802  
Class Symphyla Ryder, 1880  
Family Scolopendrellidae Newport, 1845

## Key to Afrotropical genera

- 1 First pair of legs vestigial .....2
- First pair of legs distinct .....3
- 2 Second and third tergites without transversal division; length usually 2 mm or more .....*Symphylella* Silvestri, 1902
- 2<sup>nd</sup> and 3<sup>rd</sup> tergites divided transversally; length usually < 2 mm .....*Ribautiella* Brölemann, 1926
- 3 1<sup>st</sup> pair of legs very short, with terminal setae instead of claws .....*Remysymphyla* Aubry & Masson, 1952a
- 1<sup>st</sup> pair of legs 3-segmented, with claws .....4
- 4 Tergite 17 without paired triangular processes .....*Scolopendrellopsis* Bagnall, 1913
- Tergite 17 with paired triangular processes .....*Neosymphyla* Edwards & Belfield, 1967

Genus *Symphylella* Silvestri, 1902

## Type species

*Symphylella isabellae* (Grassi, 1886), described in Italy.

## Diagnosis

Seventeen tergites, which means that the tergal areas 14 and 15 (*fide* Domínguez Camacho 2009: 108, fig. 4) are subdivided into two tergites each; first tergite smaller, tergites 2-13 and 15 with paired

triangular processes. First pair of legs reduced to hairy or spiny knobs, or spots. All tergites completely sclerotized and pubescent. Posterior border of last tergite straight.

### Species reported in the Afrotropics

*Symphylella* is subcosmopolitan and is the most diversified scolopendrellid genus, with more than 50 described species. Three species have hitherto been reported from tropical Africa, with few citations of each. Below is a checklist, arranged in alphabetical order:

1. *Symphylella foucquei* Jupeau, 1954: Réunion and Nosy-Bé (Jupeau 1954; Rochaix 1956).
2. *Symphylella isabellae* (Grassi, 1886): Madagascar (Rochaix 1956). This species is also present in Europe (e.g., Edwards 1959; Dethier 1998; Grassi 1886; Scheller 1978).
3. *Symphylella vulgaris* (Hansen, 1903): subcosmopolitan, the most widely distributed species of Symphyla so far known (Scheller 1971). Earlier records from Tropical Africa are from Congo D.R., Tanzania and Kenya (Hinschberger 1954b; Ribaut 1914; Rochaix 1955), Madagascar (Rochaix 1956) and the Réunion (Jupeau 1954).

### Key to Afrotropical species of *Symphylella*

- 1 First tergite with 6 setae .....2  
– First tergite with more than 6 setae .....5
- 2 Triangular processes of tergites without setae between apical and inner basal setae .....*foucquei* Jupeau, 1954  
– Triangular processes of tergites with one or more setae between apical and inner basal setae .....3
- 3 First leg knoblike .....*kalundu* sp. nov.  
– First leg only a spiny spot with two protruding setae .....4
- 4 Styli with terminal end clublike, posterior margin of tergites (between triangular processes) curved ...  
.....*malagassa* sp. nov.  
– Styli with terminal end with apical spine, posterior margin of tergites (between triangular processes) straight .....*vulgaris* (Hansen, 1903)
- 5 First tergite with 10 setae .....*isabellae* (Grassi, 1886)  
– First tergite with 7-8 setae .....6
- 6 All tergal setae clearly erect, inner basal setae of second and third tergites about twice longer than other posteromarginal setae .....*erecta* sp. nov.  
– Some tergal setae curved, inner basal stae of second and third tergites about as long as the other posteromarginal setae .....7
- 7 Second tergite with 4 lateromarginal setae .....*lubumbashi* sp. nov.  
– Second tergite with 5 or more lateromarginal setae .....8
- 8 Second tergite with 6 lateromarginal setae, setae of central part of third tergite much shorter than marginal setae .....*tanganyika* sp. nov.  
– Second tergite with 7 lateromarginal setae, setae of central part of third tergite as long as marginal setae .....*fuko* sp. nov.

*Symphylella erecta* sp. nov.

[urn:lsid:zoobank.org:act:BA6D2348-A8FE-4CF9-A9DB-643B55E53E78](http://urn:lsid:zoobank.org:act:BA6D2348-A8FE-4CF9-A9DB-643B55E53E78)

Figs 1, 7A

**Type material**

**Holotype**

1, sex unknown, CONGO D.R., A.N.P., Secteur Sud, riv. Fuko, affl. Dr. Rutshuru, 1300 m, coll. De Witte, 12 Nov. 1954 (MRAC 22148).

**Paratypes**

1, sex unknown, same data as holotype (MRAC 22149); 1, sex unknown, CONGO D.R., A.N.P., Secteur Sud, riv. Rumanura, affl. Fuko, 1200 m, coll. De Witte, 3 Dec. 1954 (MRAC 22150).

**Type locality**

CONGO D.R., A.N.P., Secteur Sud, riv. Fuko, affl. Dr. Rutshuru, 1300 m.

**Other material**

1, sex?, TANZANIA, Mt. Uluguru, Kinola, forêt transit, Berger, Leleup, Debecker (MRAC 22163), which probably belongs to this species, although it was not directly observed by SEM.

**Etymology**

From the Latin erectus = upright, referring to the long and erect setae on the tergites.

**Description (holotype)**

LENGTH. 2.3 mm.

HEAD. 1.1 times as long as broad with broadest part behind the middle on a level with the points of lateral protuberances (Fig. 1A). Lateral margins nearly straight. Central rod faint, most distinct in posterior half (Fig. 1A). Frontal branches also faint. Median branches absent. Dorsal surface with setae of different lengths. Cuticle with faint and dense pubescence (Fig. 1B).

ANTENNAE. Left antenna 16 segments, right 14 (Fig. 1G). First segment smallest, following segments about 1.2 times as wide as long. Total number of setae visible in dorsal view: 3 on first segment and 4 on second and third ones. Longest setae of proximal segments about 2.3 times as long as those of distal segments. Average length of setae about 0.3 diameter of the basal segments. One whorl of setae on proximal segments, secondary whorl begins on ventral side of 7<sup>th</sup> or 8<sup>th</sup> segment. Apical segment globular with several short distal setae. All segments with faint pubescence.

TERGITES (Figs 1A, 1E, 7A). First tergite rudimentary with eight setae arranged in two groups of four. Second tergite complete; triangular posterior processes with straight margins and glabrous tips, no end-swelling (Fig. 1A, E). Margin between projections straight. One marginal seta between apical and inner basal setae. Inner basal setae thick, erect and long, as long as anterolateral seta. Eight posteromarginal setae – apical ones included –, two setae in the medial position – central setae. Five lateromarginal setae on each side, –anterolateral setae included – some of them larger and very erect, alternating with the smaller ones. Anterolateral setae very prominent in all tergites except most posteriors, erect, pointing forwards and protruding from both sides. Second tergite with one anterolateral seta on each side, 3rd and following ones with two. Third tergite with six posteromarginal setae and eight lateromarginal on the right side, four visible on the left side – anterolateral setae included – some larger and very erect, alternating with smaller ones. All tergites with faint pubescence.

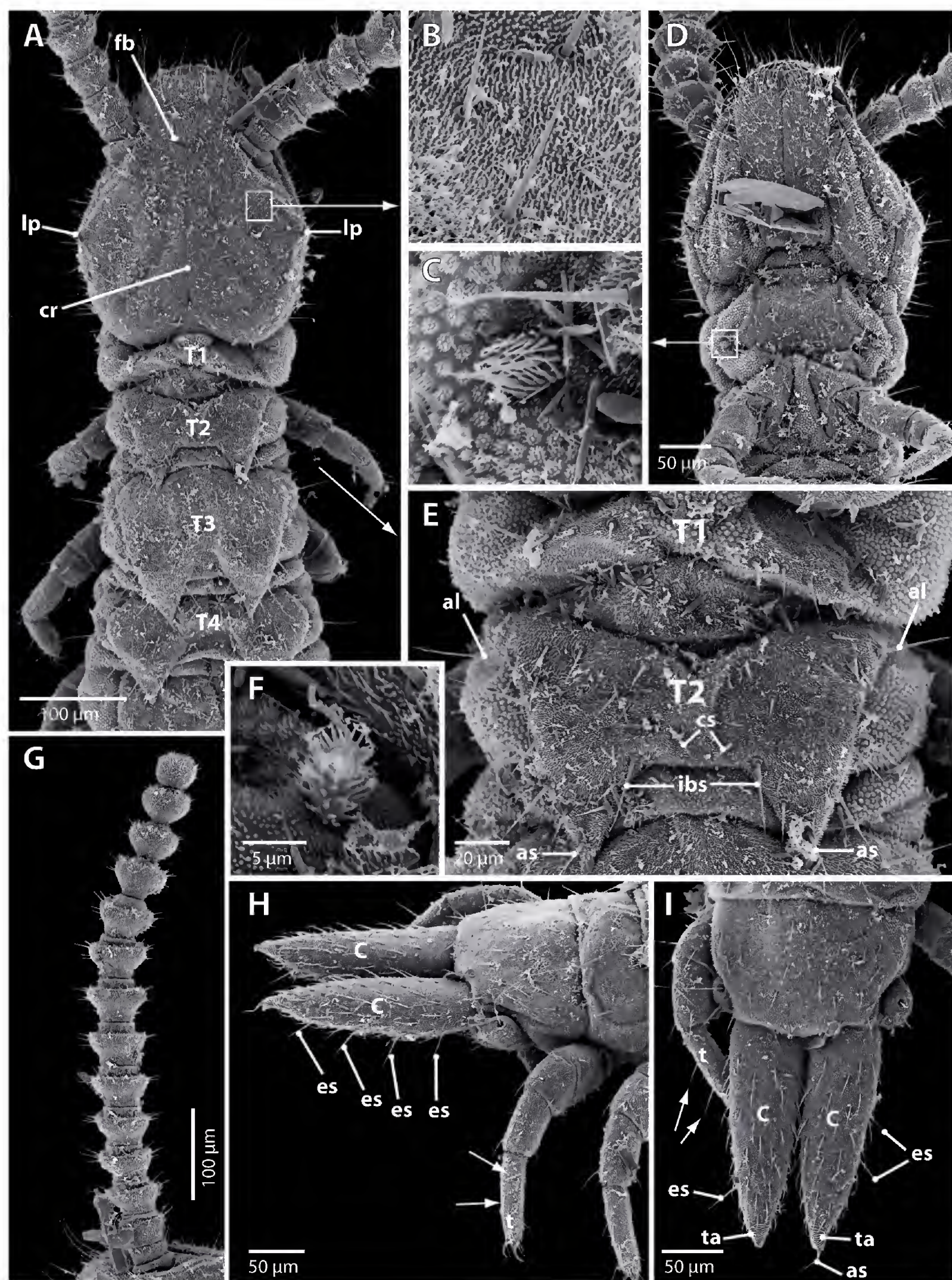


**Fig. 1.** *Symphylella erecta* sp. nov., holotype (dorsal and lateral views) and paratype MRAC 22149 (ventral view). **A.** Head and first 4 tergites (*T1*, *T2*, *T3*, *T4*), dorsal view. *Cr*, central rod; *fb*, frontal branches; *lp*, lateral protuberances of head. **B.** Detail of the surface of head. **C.** Detail of first leg. **D.** Head and first 2 pairs of legs, ventral view. **E.** Detail of first (*T1*) and second tergites (*T2*). *Al*, anterolateral setae; *as*, apical setae; *cs*, central setae of the posteromarginal setae; *ibs*, inner basal setae of the posteromarginal setae. **F.** Stylus of leg 10. **G.** Right antenna. **H.** Posterior part of trunk, last pair of legs (*t*, tarsus) and cerci (*C*), lateral view. *Arrows*: erect setae of tarsus, *es*, ventral erect setae of cercus. **I.** Posterior part of trunk, last left leg and cerci (*C*), dorsal view. *Arrows*: two erect setae of tarsus (*t*) of the last left leg; *as*, apical seta; *es*, erect setae of the outer side of the cerci; *ta*, terminal area.

LEGS. First pair of legs not visible in holotype, strongly reduced to small spiny spot with two protruding setae each in paratypes (Fig. 1C, D). Last pair of legs with few and small setae. (Fig. 1H). Tarsus with a few distinct small setae in distal part and two longer and erect setae on dorsal side (Fig 1H, I). Cuticle with very faint pubescence.

STYLI. Not visible in holotype, short and subglobular, with short thick hairs in paratypes (Fig. 1F).

CERCI. 3.2 times as long as wide, slightly curved laterally (Fig. 1I). 35-40 setae in dorsal view on each cercus. Setae either short, slightly curved, depressed, clothing all sides, or long straight erect, inserted on outer and ventral sides. Distal half of outer side with 1 or 2 long and erect setae; ventral side with 4-6 erect setae arranged in a longitudinal row (Fig. 1H). Cuticle with faint pubescence. Terminal area conical, 0.1 times of the length of cerci, six-nine transversal striae. Apical seta curved inwards, about as long as terminal area.

### Affinities and differential diagnosis

*Symphylella erecta* is very similar to *S. simplex* (Hansen, 1903) and *S. multisetosa* Scheller, 1971 from South Asia. These species differ from all other *Symphylella* species in the combination of having 8 setae on the first tergite, setae between the apical and inner basal setae of the triangular processes, some of the lateromarginal setae on the second tergite erect and the presence of at least one row of erected setae in the ventral part of the cerci. However, *S. erecta* is distinguished by the presence of long inner basal setae on the triangular processes of the second tergite, as long as the largest lateromarginal one, strongly reduced first pair of legs and the presence of frontal branches in the head. The presence of the subglobular styli is also a diagnostic feature of this species.

### *Symphylella fuko* sp. nov.

[urn:lsid:zoobank.org:act:61460AA1-87DF-4E69-B5CD-79799F57955F](http://urn:lsid:zoobank.org:act:61460AA1-87DF-4E69-B5CD-79799F57955F)

Figs 2, 7B

### Type material

#### Holotype

Sex unknown, CONGO D.R., A.N.P., secteur sud, riv. Rumanura, affl. Fuko, 1200 m, coll. De Witte, 14 Jul. 1954 (MRAC 22151).

#### Type locality

CONGO D.R., A.N.P., secteur sud, riv. Rumanura, affl. Fuko, 1200 m.

#### Etymology

The species name is a noun in apposition taken from the type locality.

#### Description (holotype)

LENGTH. 2.5 mm.

HEAD. 1.1 times as long as broad with broadest part behind the middle on a level with lateral protuberances (Fig. 2A). Lateral margins nearly straight. Central rod thin, nearly indistinct in the anterior part. Frontal branches present but no median branches. Dorsal surface mostly covered with short setae, the longest are situated in the anterior part and in the lateral margins. Cuticle with faint and dense pubescence (Fig. 2C).

ANTENNAE. Left antenna 19 segments, right 18 (Fig. 2G). First segment smaller, 2<sup>nd</sup> and 3<sup>rd</sup> segments about 1.2 times as wide as long. The following segments are gradually wider, about 1.8 times as wide as

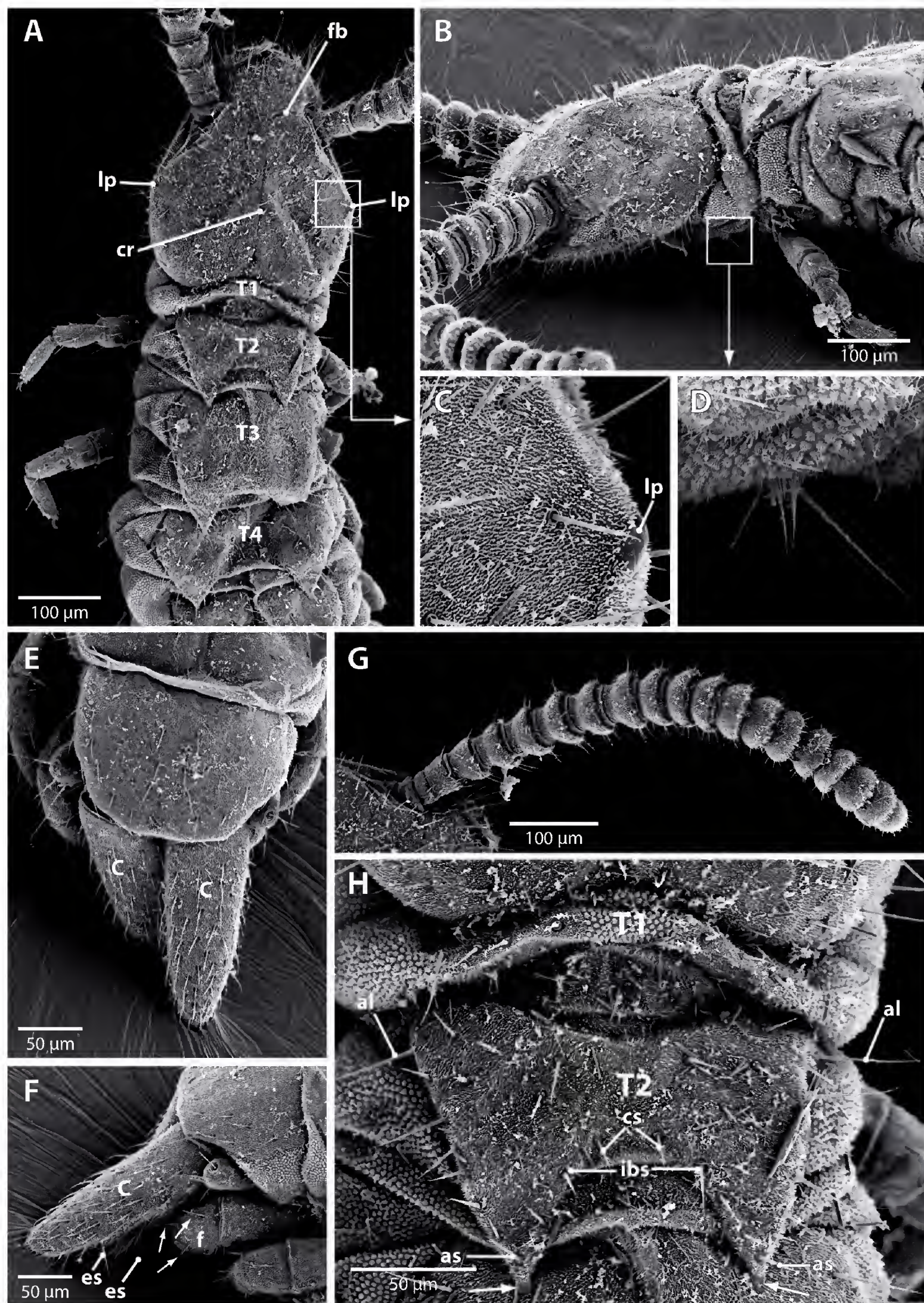


**Fig. 2.** *Symphylella fuko* sp. nov., holotype. **A.** Head and first 4 tergites (*T1*, *T2*, *T3*, *T4*), dorsal view. *Cr*, central rod; *fb*, frontal branches; *lp*, lateral protuberance of head. **B.** Head and anterior part of trunk, lateral view. **C.** Detail of the surface of head and lateral protuberance of head (*lp*). **D.** Detail of first leg. **E.** Posterior part of trunk and cerci (*C*), dorsal view. **F.** Posterior part of trunk, last right legs and cerci (*C*), lateral view. *Arrows*, longer and erect setae of femur (*f*) of last leg; *es*, erect setae of ventral side of cerci. **G.** Left antenna. **H.** Detail of first (*T1*) and second (*T2*) tergites. *Arrows*, small end-swelling of triangular processes; *al*, anterolateral setae; *as*, apical setae; *cs*, central setae of the posteromarginal setae; *ibs*, inner basal setae of the posteromarginal setae.

long in the 12<sup>th</sup>. Setae about 0.2 times the diameter of the segments; shorter in the most distal segments. No second whorl of setae from dorsal view. Apical segment subglobular, slightly wider than long. All segments with faint pubescence.

TERGITES (Figs 2A, H, 7B). First tergite rudimentary with seven setae arranged in two groups of three and four. Second tergite complete; triangular processes with straight margins and small end-swellings (Fig. 2A, H). Margin between projections straight. One marginal setae between apical and inner basal setae on the left triangular projection, two on the right one; nine posteromarginal setae with equal length, with two central ones; seven lateromarginal setae on each side. Anterolateral setae longer than others. Third tergite with ten lateromarginal setae on the left side, right margin not entirely visible. All tergites with faint pubescence.

LEGS. First pair of legs strongly reduced to spiny spots with two protruding setae and two longer setae on both sides (Fig. 2B, D). Anterior seta as long as protruding seta of the spot. Posterior seta 4 times longer of anterior one and pointing backwards. Last pair of legs barely visible in the holotype, with three longer seta on dorsal part of the femur – one in the proximal part and two in the distal part – and one on the tibia (Fig. 2F). Cuticle with very faint pubescence.

STYLI. Not visible.

CERCI. 2.5 times as long as wide, sides slightly curved (Fig. 2E). Setae generally short, slightly curved and depressed on all sides; 40 visible from the dorsal view. One erect and longer seta on the ventral side of both cerci (Fig. 2F). Cuticle with very faint pubescence. Terminal area not visible in the holotype.

#### Affinities and differential diagnosis

The combination of a relative high number of setae on the first tergite – four setae on the left half – and on the second tergite – nine posteromarginal and seven lateromarginal setae – is shared by *S. fuko* sp. nov., *S. simplex*, *S. multisetosa* and *S. neotropica* (Hansen, 1903). The presence of only three setae on the right half of the first tergite, longer and erect setae on the second and third tergites and the frontal branches of the central rod on the head are characteristic for *S. fuko* sp. nov. This species also differs from *S. multisetosa* and *S. neotropica* in the first pair of legs, which is strongly reduced to spiny spots. The chaetotaxy and morphology of the first three tergites in *S. fuko* sp. nov. are also similar to those of *S. erecta* sp. nov., but *S. fuko* sp. nov. is easily distinguished by the regular size of the inner basal setae on the second tergite and the shorter anterolateral setae.

*Symphylella kalundu* sp. nov.

[urn:lsid:zoobank.org:act:85A76008-BDBE-4679-9271-EC8A4ACCA7B7](http://urn:lsid:zoobank.org:act:85A76008-BDBE-4679-9271-EC8A4ACCA7B7)

Figs 3, 7C

#### Type material

##### Holotype

♂, CONGO D.R., Terr. Uvira, Kalundu (03°27' S, 029°08' E), 800 m, coll. Leleup N., Feb. 1958 (MRAC 22152).

##### Paratypes

4, sex unknown, same data as holotype (MRAC 22153).

#### Type locality

CONGO D.R., Terr. Uvira, Kalundu (03°27' S, 029°08' E), 800 m.

### Etymology

The species name is a noun in apposition taken from the type locality.

### Description (holotype)

LENGTH. 2 mm.

HEAD. 1.2 times as long as broad, with broadest part behind the middle on a level with the lateral protuberances of the head (Fig. 3A). Lateral margins nearly straight. Central rod distinct, thin, with a node at the middle. Frontal branches present, no median branches. Dorsal surface covered by setae of subequal length. Cuticle with faint and dense pubescence (Fig. 3B).

ANTENNAE. Right antenna broken, left antenna 16 segments (Fig. 3F). First segment elongate, about 0.5 times as wide as long; 2<sup>nd</sup> and 3<sup>rd</sup> as wide as long; following segments of equal size, about 1.2 times as wide as long. Setae about 0.2 of diameter of segments, shorter in the most distal segments. No second whorl of setae. Apical segment subglobular. All segments with faint pubescence.

TERGITES (Figs 3A, E, 7C). First tergite rudimentary with six setae arranged in two groups of three. One short seta between first and second tergites in the median part (Fig. 3E). Second tergite with one seta between apical and inner basal setae of the triangular processes. Triangular processes with very small end-swellings (Fig. 3E). Margin between processes slightly curved. Second tergite with a total of seven posteromarginal setae, one central seta in the medial position. Five lateromarginal setae on the right side, short. Anterolateral setae slightly longer than the other lateromarginal setae. Only three lateromarginal setae visible on the left side. Third tergite with five posteromarginal setae, without setae between apical and inner basal setae of the triangular processes, seven lateromarginal setae on the right side, only four visible on the left side. All tergites with very faint, short and sparse pubescence.

LEGS. First pair of legs reduced to small spiny knobs, each with one distal seta (Fig. 3C, D). Last pair of legs with few and small setae. Tarsus with few long and curved setae in the distal part (Fig. 3G), absent in one paratype (Fig. 3H). Cuticle pubescent.

STYLI. Extremely short, barely visible (Fig. 3I).

CERCI. 3.2 times as long as wide, laterals slightly curved, with 10 dorsal setae long, slightly curved and depressed (Fig. 3G). Ventral side with five protruding and erect setae arranged in a longitudinal row (Fig. 3H). Cuticle pubescent. Terminal area conical, 0.14 times as long as the total length of the cerci, with 4 proximal striae straight and three distal striae curved and concentric. No apical setae, probably lost in all specimens.

### Affinities and differential diagnosis

The species is similar to *S. vulgaris* (Hansen, 1903) and *S. asiatica* Scheller, 1971, since they share some similarities in the chaetotaxy of the two first tergites: six setae on the first tergite, seven posteromarginal setae on the second tergite with one central seta in the medial position and one seta between apical and inner basal setae of each triangular process. Further similarities in the chaetotaxy of the tergites are shared by *S. kalundu* sp. nov. and *S. asiatica*, such as 5 lateromarginal setae on the second tergite and 8 on the third one, while they are respectively 8 and 10 in *S. vulgaris* (Hansen, 1903). The absence of setae between the apical and inner basal setae of the triangular processes on the third tergite is characteristic of *S. kalundu* sp. nov. The chaetotaxy of the cerci is more similar to that of *S. vulgaris* (Hansen, 1903) than the one observed in *S. asiatica*, since there is only one row of ventral setae erect, and there are no erect dorsal setae.

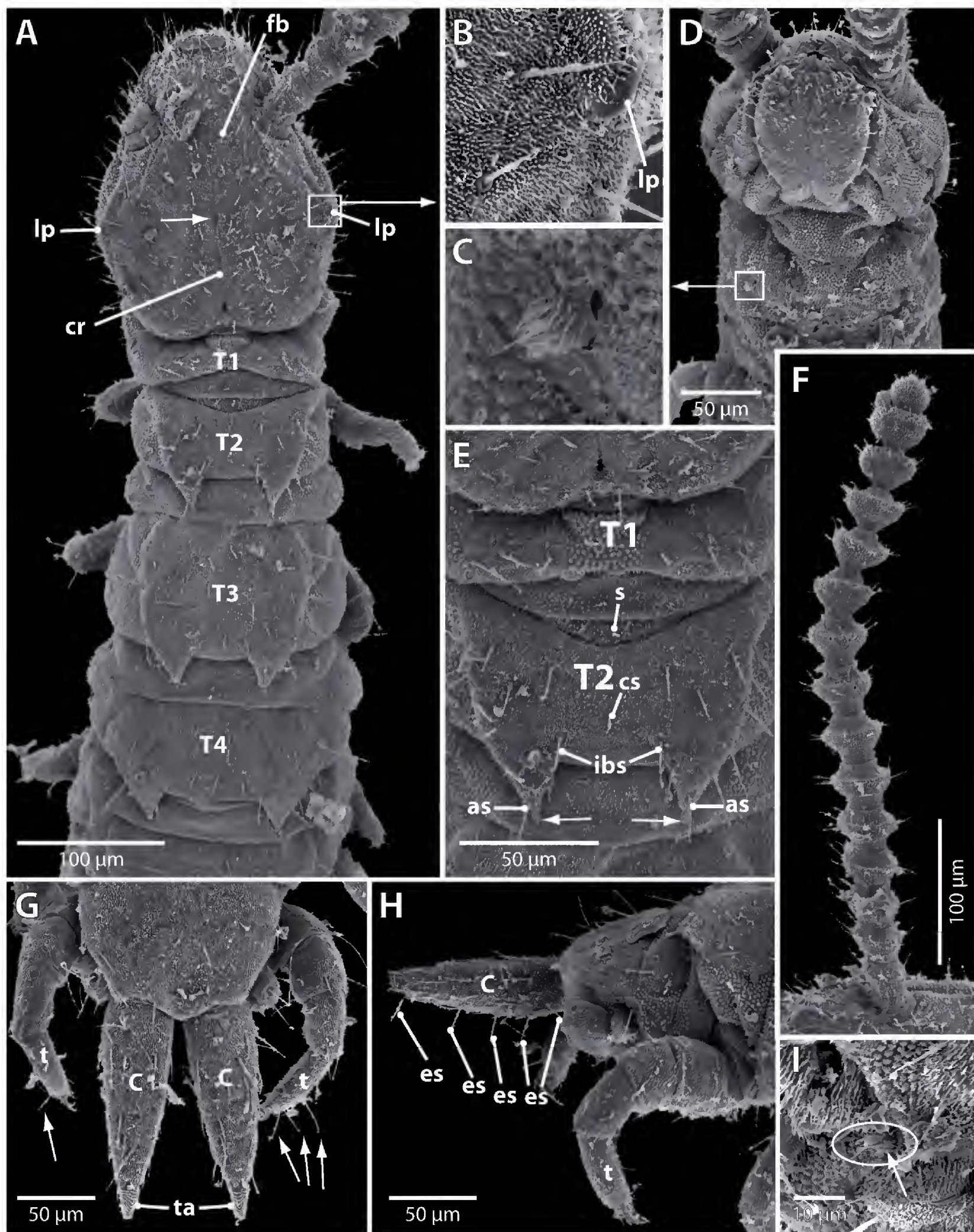


**Fig. 3.** *Symphylella kalundu* sp. nov., holotype (dorsal views) and paratype (ventral and lateral views). **A.** Head and first 4 tergites (*T1*, *T2*, *T3*, *T4*), dorsal view. *Arrow*: node in the middle of the central rod (*cr*); *fb*, frontal branches, *lp*, lateral protuberance of the head. **B.** Detail of the surface of the head and lateral protuberance (*lp*). **C.** Detail of the first leg. **D.** Head and anterior part of the trunk, ventral view. **E.** Detail of the first (*T1*) and second (*T2*) tergites. *Arrows*, small end-swelling of triangular processes; *as*, apical setae; *cs*, central seta of the posteromarginal setae; *ibs*, inner basal setae of the posteromarginal setae; *s*, seta between first and second tergites. **F.** Right antenna. **G.** Last tergite, last pair of legs and cerci (*C*), dorsal view. *Arrows*, longer and erect setae of tarsus (*t*) of last pair of legs; *ta*, terminal area of cerci. **H.** Posterior part of the trunk, last right leg and right cercus (*C*), lateral view. *Es*, erect setae of ventral side of cerci; *t*, tarsus of last leg, without setae. **I.** Stylus of the leg 10 (*arrow* and *circle*).

*Symphylella lubumbashi* sp. nov.

[urn:lsid:zoobank.org:act:5AD5782F-EB94-4BFF-B70F-A9BB5E6728B1](https://doi.org/10.21203/rs.3.rs-1000000/v1)

Figs 4, 7D

**Type material**

**Holotype**

Sex unknown, CONGO D.R., Shaba, Lubumbashi (11°40' S, 027°28' E), coll. Goffinet G., Dec. 1969 (MRAC 22154).

**Paratypes**

2, sex unknown, same data as holotype (MRAC 22155); 2, sex unknown, same data as holotype (MRAC 22156).

**Type locality**

CONGO D.R., Shaba, Lubumbashi (11°40' S, 027°28' E).

**Etymology**

The species name is a noun in apposition taken from the type locality.

**Description (holotype)**

LENGTH. 1.8 mm.

HEAD. 1.2 times as long as broad with broadest part in the middle on a level with lateral protuberances (Fig. 4A). Lateral margins nearly straight. Central rod thin, more distinct in the posterior half. Frontal branches not visible in any of the studied specimens. Median branches absent. Dorsal surface with short setae. Cuticle with faint and dense pubescence (Fig. 4B).

ANTENNAE. Proportionately short and depressed, left antenna broken, right with 14 segments (Fig. 4F). First segment smaller, following segments pretty broad, about twice as wide as long. Length of setae 0.25-0.3 times the diameter of segments, shorter in most distal segments. No second whorl of setae. Apical segment subglobular, wider than long. All segments with faint pubescence.

TERGITES (Figs 4A, E, 7D). First tergite rudimentary with seven setae arranged in two groups of three and four. Triangular processes of following tergites with straight margins, prominent end-swelling and one seta between apical and inner basal setae (Fig. 4E). One short seta between first and second tergites in the median part (Fig. 4E). Second tergite with seven posteromarginal setae, only one central seta, and four thick and erect lateromarginal setae (Fig. 4E). Anterolateral seta longer and well distinct in all anterior tergites. Margin between triangular projections straight in the second tergite but curved in the following ones. Third tergite with eight posteromarginal setae with two central ones, six-seven lateromarginal setae. Setae of the central part of third tergite clearly shorter than marginal ones. All tergites with a dense and conspicuous pubescence.

LEGS. First pair of legs strongly reduced to small spiny spot with two protruding setae (Fig. 4C, D). Last pair of legs with protruding setae in the distal part of the joints (Fig. 4H). Femur with one longer distal seta on the dorsal side. Tibia with four protruding setae in the distal part. Tarsus with three thick and protruding distal setae. Cuticle pubescent.

STYLI. Small, elongate, covered by hairs resembling a spike (Fig. 4F).

CERCI. 2.5 times as long as wide, with slightly curved sides (Fig. 4I). 25-30 long, straight and depressed dorsal setae. Outer side of distal half with one or two erect setae; ventral side with four or five setae – not

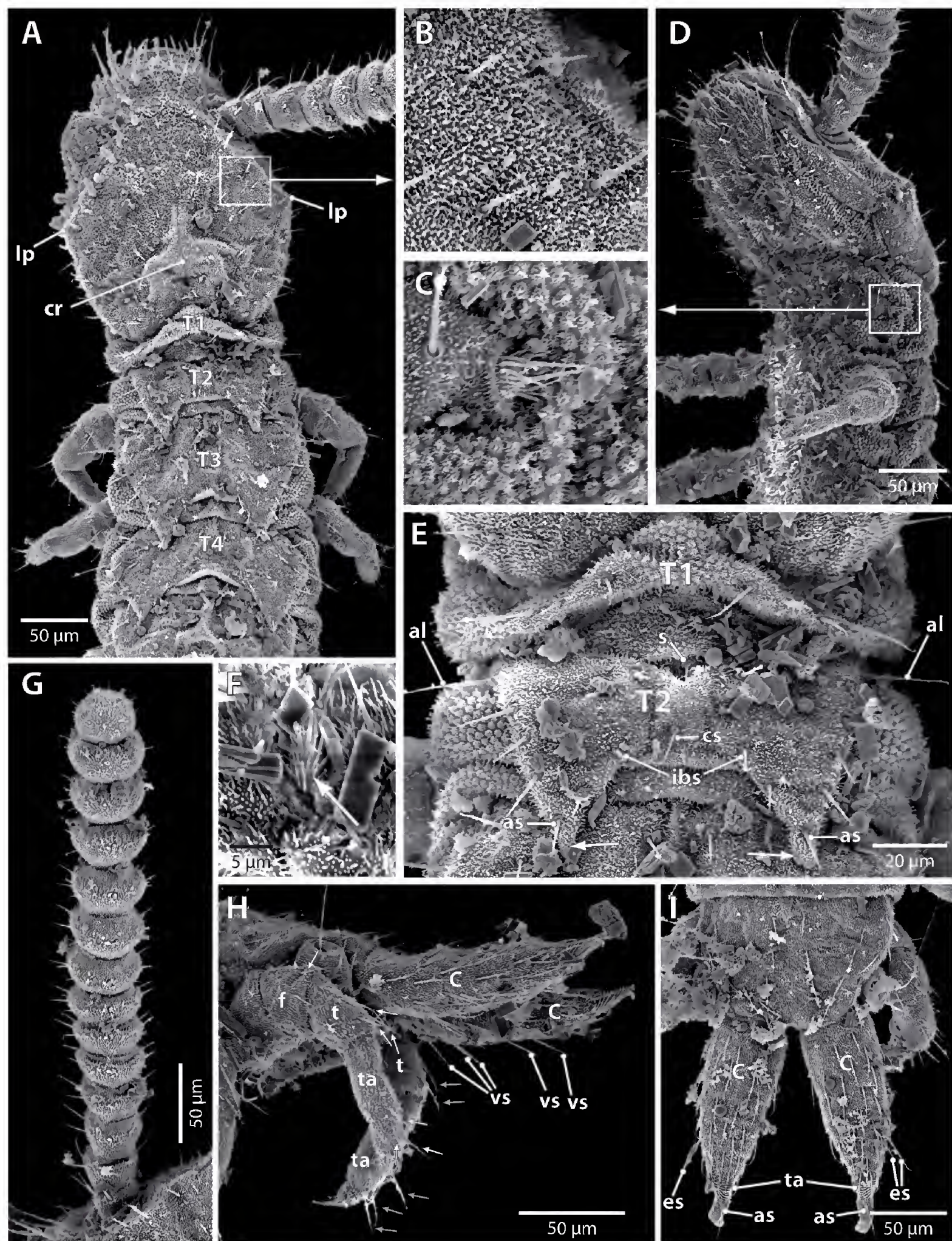


**Fig. 4.** *Symphylella lubumbashi* sp. nov., holotype (dorsal views) and paratype (ventral and lateral views). **A.** Head and first 4 tergites (*T1*, *T2*, *T3*, *T4*), dorsal view. *Cr*, central rod; *lp*, lateral protuberances of the head. **B.** Detail of the surface of the head. **C.** Detail of the first leg. **D.** Head and first 2 pairs of legs, ventro-lateral view. **E.** Detail of first (*T1*) and second (*T2*) tergites. *Arrows*, small end-swelling of triangular processes; *al*, anterolateral setae; *as*, apical setae; *cs*, central seta of the posteromarginal setae; *ibs*, inner basal setae of the posteromarginal setae; *s*, seta between first and second tergites. **F.** Right antenna. **G.** Stylus of the leg 11 (*arrow*). **H.** Posterior part of the trunk, last pair of legs and cerci (*C*), lateral view. *White arrows*, protruding setae of the femur (*f*), tibia (*t*) and tarsus (*ta*) of last left leg; *grey arrows*, protruding setae of tibia (*t*) and tarsus (*ta*) of the right left; *vs*, ventral setae of right cercus, in a row. **I.** Last tergite and cerci (*C*), dorsal view. *As*, apical setae; *es*, erect setae of outer side of cerci, *ta*, terminal area.

erect – arranged in a longitudinal row (Fig. 4H). Cuticle with faint pubescence. Terminal area conical, 0.1 times as long as the total length of the cerci with seven-nine transversal striae (Fig. 4I). Apical seta straight, 1.7 times as long as terminal area.

#### **Affinities and differential diagnosis**

The presence of only four lateromarginal setae on the second tergite is a characteristic feature shared by *S. lubumbashi* sp. nov., *S. foucquei* Jupeau, 1954 and *S. elongata* Scheller, 1952. However, *S. lubumbashi* sp. nov. differs from the latter two species by the presence of a seta between apical and inner basal setae of the triangular processes on the second and third tergites.

#### **Remarks**

There is intraspecific variation in the chaetotaxy of the first and second tergites: one paratype presents only six setae on the first tergite, and a small seta between the anterolateral and the following more posterior on the second tergite.

*Symphylella malagassa* sp. nov.

[urn:lsid:zoobank.org:act:C4DFCE1D-B8E1-401C-835A-0C2240AA57AF](https://zoobank.org/urn:lsid:zoobank.org:act:C4DFCE1D-B8E1-401C-835A-0C2240AA57AF)

Figs 5, 7E

#### **Type material**

##### **Holotype**

Sex unknown, MADAGASCAR, Foulpointe (17°40' S, 049°31' E), coll. Pauly A., 12-17 Dec. 1993 (MRAC 22157).

##### **Paratypes**

1♀, same data as holotype (MRAC 22158).

#### **Type locality**

MADAGASCAR, Foulpointe (17° 40' S, 049° 31' E).

#### **Etymology**

The species name is an adjective derived from Madagascar.

#### **Description (holotype)**

LENGTH. 2.00 mm.

HEAD. 1.7 times as long as broad with broadest part behind the middle on a level with lateral protuberances (Fig. 5A). Lateral margins of head nearly straight. Central rod only distinct in the posterior half. Frontal branches well developed and median branches indistinct. Dorsal surface with short and thin setae, becoming denser in the posterior part. Cuticle with faint and dense pubescence (Fig. 5B).

ANTENNAE. Left antenna with 16 segments, right with 17 (Fig. 5F). First segment small, 0.4 times the length of 2<sup>nd</sup> segment. Following segments with regular size, about 1.2 times as wide as long. Inner setae of the second and third segments straight and longer than the ones of the following segments (Fig. 5F). Longest inner seta of the third segment 0.6 times as long as the diameter of segment, while length of the ones in the following segments about 0.3 times the diameter, even shorter in the most distal segments. No second whorl of setae. Apical segment globular, all segments with faint pubescence.

TERGITES (Figs 5A, E, 7E). First tergite rudimentary with six setae arranged in two groups of three. Following tergites with quite curved lateral margins and well demarcated curved posterior margins

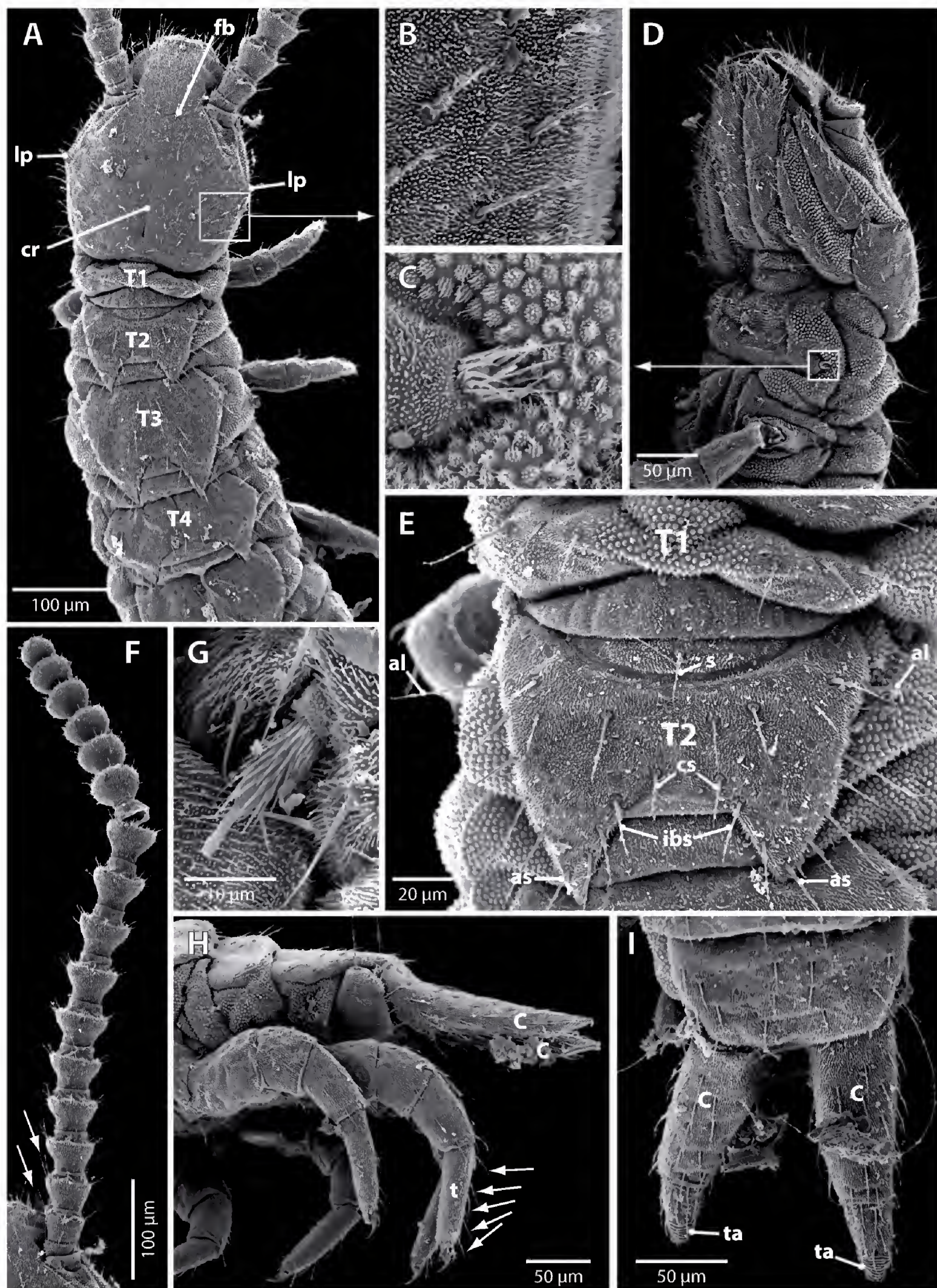


**Fig. 5.** *Symphylella malagassa* sp. nov., holotype (dorsal views) and paratype (ventral and lateral views). **A.** Head and first 4 tergites (*T1*, *T2*, *T3*, *T4*), dorsal view. *Cr*, central rod; *fb*, frontal branches; *lp*, lateral protuberances of the head. **B.** Detail of the surface of the head. **C.** Detail of the first leg. **D.** Head and first 2 pairs of legs, ventro-lateral view. **E.** Detail of first (*T1*) and second (*T2*) tergites. *Al*, anterolateral setae; *as*, apical setae; *cs*, central setae of the posterolateral setae; *ibs*, inner basal setae of the posteromarginal setae; *s*, seta between first and second tergites. **F.** Right antenna. *Arrows*, longer inner setae of second and third segments. **G.** Stylus of the leg 11. **H.** Posterior part of the trunk, last pairs of legs and cerci (*C*), lateral view. *Arrows*, longer setae of the tarsus (*t*) of last left leg. **I.** Last tergite and cerci (*C*), dorsal view. *Ta*, terminal area.

between triangular processes. Processes without end-swelling, tips slightly pointing inwards. One seta between first and second tergites in the median part (Fig. 5E). Second tergite with nine posteromarginal, two central and five lateromarginal setae. One seta between apical and inner basal setae on the left triangular process, two on the right one. Anterior margin of second tergite concave. Anterolateral setae longer and well distinct in all anterior tergites. Third tergite with seven-ten lateromarginal and ten posteromarginal setae.

LEGS. First pair of legs strongly reduced to small spiny spots (Fig. 5C, D). Last pair of legs with small setae on the whole surface. Tarsus with a longitudinal row of five longer setae on the dorsal side (Fig. 5H). Cuticle pubescent.

STYLI. Small, elongate and spike-like, covered by hairs, with a club-like distal process (Fig. 5G).

CERCI. 3 times as long as wide, with straight sides (Fig. 5I). 25-30 setae in dorsal view, slightly curved and depressed. Cuticle with faint pubescence. Terminal area conical, quite wide, 0.1 times as long as the total length of the cerci, with 8 transversal striae. No apical setae, probably lost in both studied specimens.

### Affinities and differential diagnosis

*Symphylella malagassa* sp. nov. is similar to *S. kalundu* sp. nov., *S. asiatica* Scheller, 1971 and *S. brincki* Scheller, 1971, since they present six setae on the first tergite and five lateromarginal setae on the second one. *S. malagassa* sp. nov. differs by the presence of two or three setae between the apical and inner basal setae of the triangular processes instead of one, the higher number of posteromarginal setae on the third tergite and the characteristic curvature of the posterior margin of the tergites. Another remarkable diagnostic feature of this species is the club-like distal end of the styli.

*Symphylella tanganyika* sp. nov.

[urn:lsid:zoobank.org:act:E92B089D-B6F7-44C2-8CC1-52CDA5BE742](https://zoobank.org/urn:lsid:zoobank.org:act:E92B089D-B6F7-44C2-8CC1-52CDA5BE742)

Figs 6, 7F

### Type material

#### Holotype

Sex unknown, TANZANIA, Mt. Uluguru, Kinola, 1500-1750 m, coll. Berger, Leleup and Debecker, 6-13 Jun. 1971 (MRAC 22159).

#### Paratypes

2 ♂♂, same data as holotype (MRAC 22160).

### Type locality

TANZANIA, Mt. Uluguru, Kinola, 1500-1750 m.

### Etymology

The species name is a noun in apposition taken from the old name of the type locality.

### Description (holotype)

LENGTH. 1.7 mm.

HEAD. 1.2 times as long as broad with broadest part behind the middle on a level with lateral protuberances (Fig. 6A). Lateral margins rounded. Central rod very thin, well distinct in the posterior part. Frontal

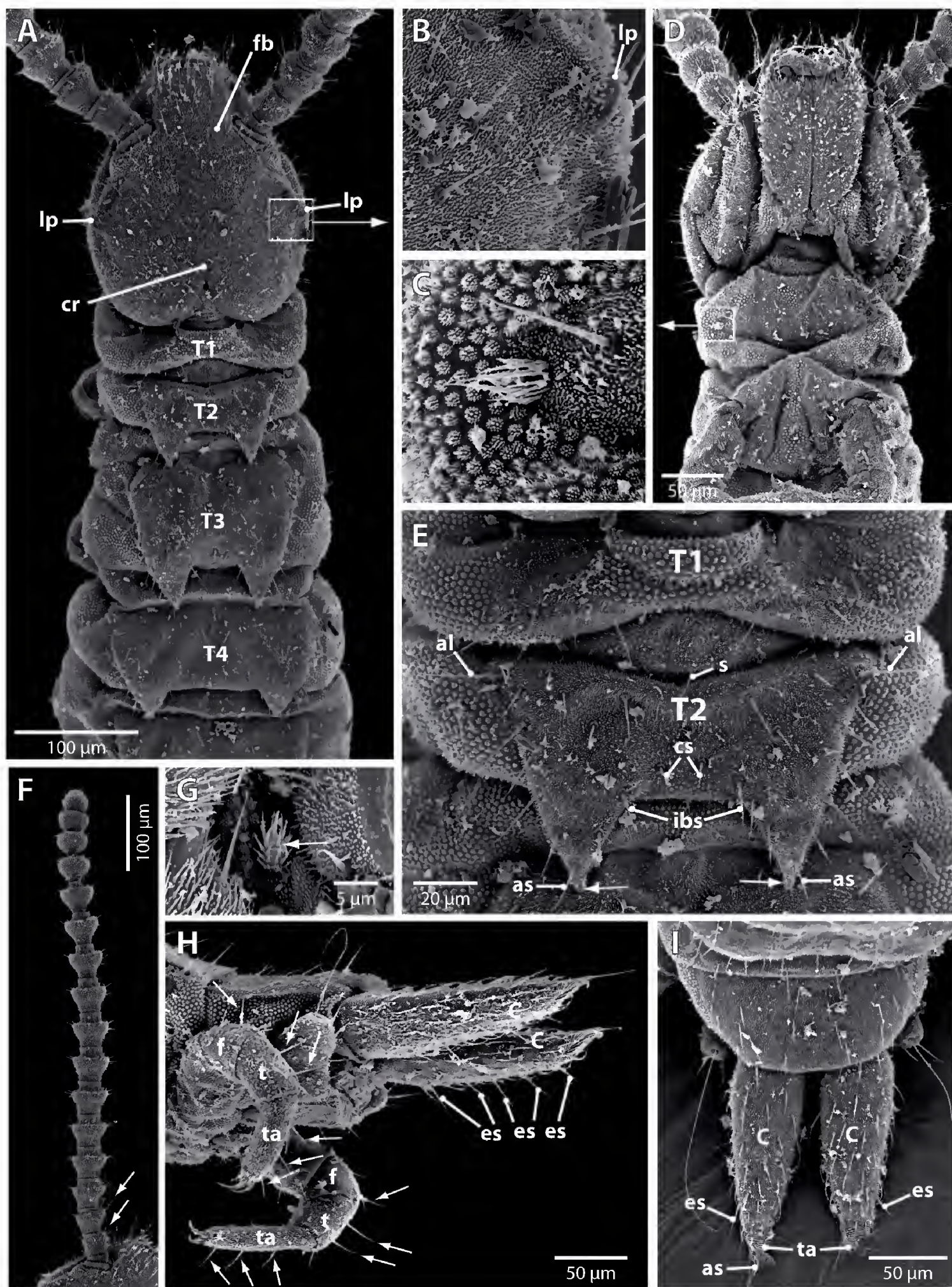


**Fig. 6.** *Symphylella tanganyika* sp. nov., holotype (dorsal views) and paratype (ventral and lateral views). **A.** Head and first 4 tergites (*T1*, *T2*, *T3*, *T4*), dorsal view. *Cr*, central rod; *fb*, frontal branches; *lp*, lateral protuberances of the head. **B.** Detail of the surface of the head and lateral protuberance (*lp*). **C.** Detail of the first leg. **D.** Head and first 2 pairs of legs, ventral view. **E.** Detail of first (*T1*) and second (*T2*) tergites. *Arrows*, small end-swelling of triangular processes; *al*, anterolateral setae; *as*, apical setae; *cs*, central seta of the posteromarginal setae; *ibs*, inner basal setae of the posteromarginal setae; *s*, seta between first and second tergites. **F.** Left antenna. *Arrows*, longer inner setae of the second and third segments. **G.** Stylus of the leg 11 (*arrow*). **H.** Posterior part of the trunk, last pairs of legs and cerci (*C*), lateral view. *Arrows*, longer setae of the femur (*f*), tibia (*t*) and tarsus (*ta*) of last legs; *es*, erect setae of ventral side of right cercus. **I.** Last tergite and cerci (*C*), dorsal view. *As*, apical setae; *es*, erect setae of outer side of cerci; *ta*, terminal area.

branches present, faint, and median branches absent. Dorsal surface with rather short setae. Cuticle with faint and dense pubescence (Fig. 6B).

ANTENNAE. Left antenna with 16 segments, right with 17 (Fig. 6F). First segment much smaller than following ones, about 0.3 times the length of 2<sup>nd</sup> segment. Following segments with regular size. Inner setae of 2<sup>nd</sup> and 3<sup>rd</sup> segments longer than the ones of the following segments. Longest inner seta of the third segment 0.4 times the diameter of segment, length of the ones in the following segments about 0.2-0.3 times of diameter, gradually shorter towards the apex. Secondary whorl of setae begins on the ventral side of the 7<sup>th</sup> segment. Apical segment globular, with several small terminal setae. All segments with faint pubescence.

TERGITES (Figs 6A, E, 7F). Small in comparison with the general width of the head and the body; width 0.6-0.8 times of the diameter of the trunk at the same level. First tergite rudimentary with eight setae arranged in two groups of four. One seta between first and second tergites in the median part (Fig. 6E). Lateral and posterior margins of second tergite straight. Nine posteromarginal setae with two central setae. One seta between apical and inner basal setae on the left triangular process, two on the right one. Six lateromarginal setae. Anterolateral setae comparatively not very long in the anterior tergites. Third tergite with eight posteromarginal setae and nine lateromarginal. Setae of the central part of third tergite clearly shorter than marginal ones. All tergites with faint pubescence.

LEGS. First pair of legs strongly reduced, in a small spiny spot with two protruding setae (Fig. 6C, D). Last pair of legs with thick and erect setae, sparse in the dorsal parts of the joints: femur with one erect seta in the distal part, tibia with two and tarsus with three protruding setae in a longitudinal row (Fig. 6H). Cuticle pubescent.

STYLI. Very small, subglobular, covered by a moderate number of spiny hairs (Fig. 6G).

CERCI. 2.5-2.7 times as long as wide, slightly curved laterally (Fig. 6I) and dorsally straight (Fig. 6H). Many short, slightly curved and depressed setae on all sides. Outer side with one protruding setae in the distal part (Fig. 6I), ventral with five setae arranged in a longitudinal row (Fig. 6H). Terminal area of the right cercus not entirely visible; terminal area of the left cercus conical, quite wide, 0.1 times as long as the total length of the cerci, with five transversal proximal striae and four curved, concentric distal striae (Fig. 6I). Apical seta curved, about as long as terminal area.

### **Affinities and differential diagnosis**

*S. tanganyika* sp. nov. is similar to *S. erecta* sp. nov.; they share the presence of eight setae on the first tergite and the subglobular styli. It is distinguished from *S. erecta* sp. nov. the chaetotaxy of the second and third tergites, the length of the antennae, which are longer in *S. tanganyika* sp. nov., the smaller general size of the tergites and the presence of several protruding setae on the dorsal side of the last pair of legs.

Genus *Remysymphyla* Aubry & Masson, 1952a

### **Type species**

*Remysymphyla maura* Aubry & Masson, 1952a, described from Morocco.

### **Diagnosis**

First pair of legs very short, jointed, with terminal setae instead of claws (Figs 8B, C, D, 9H).

15-21 tergites, first tergite rudimentary, posterior tergites of tergal areas (*vide* Domínguez Camacho 2009: 108, fig. 4) 2-14 with paired, triangular posterior processes. The presence of 15 tergites was defined as one of the main autapomorphies of this genus in the literature (Aubry & Masson 1952a;

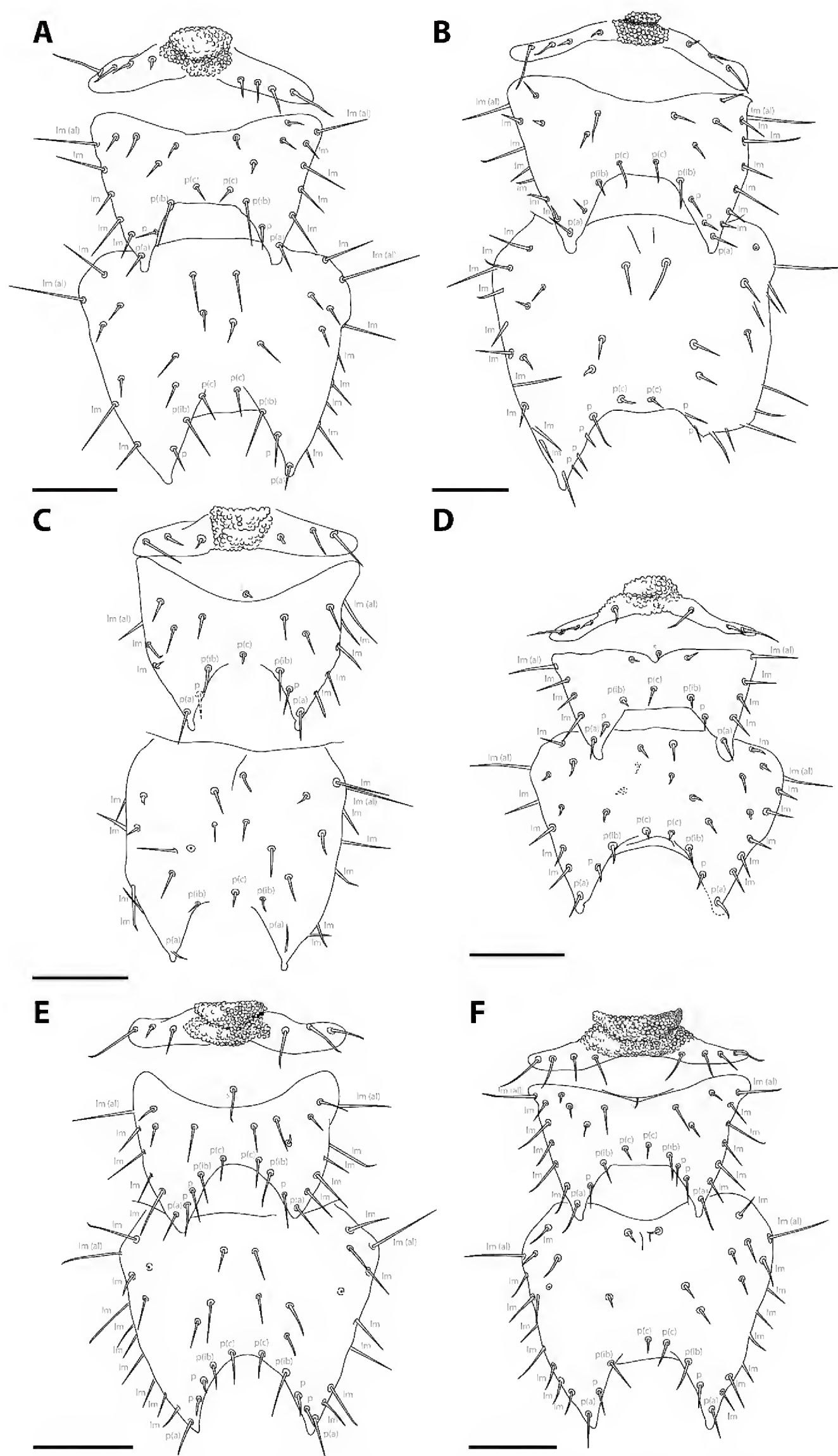


**Fig. 7.** Schemata of the three first tergites and chaetotaxy of the described species of *Symphylella*. **A.** *S. erecta* sp. nov. **B.** *S. fuko* sp. nov. **C.** *S. kalundu* sp. nov. **D.** *S. lubumbashi* sp. nov. **E.** *S. malagassa* sp. nov. **F.** *S. tanganyika* sp. nov. — Marginal setae of second and third tergites labelled: *lm*, lateromarginal setae; *lm (al)*, anterolateral seta of lateromarginal; *p*, posteromarginal setae; *p(a)*, apical setae – belonging to the posteromarginal setae; *p(c)*, central setae of posteromarginal; *p(ib)*, inner basal setae of posteromarginal; *s*, seta between first and second tergites. Scale: 50  $\mu$ m.

Edwards 1959). However, the observation of type material of *Remysymphyla hova* Aubry & Masson, 1952b (MNHN K002) using SEM has shown that it really presents 21 tergites. It means that the tergites of the tergal areas 6, 9, 12, 13, 14 and 15 (*fide* Domínguez Camacho 2009: 108, fig. 4) are subdivided into two subtergites each (Figs 8A, E, 10A), as occurs in many scolopendrellid genera.

Tergites of the tergal areas 3-14 (*fide* Domínguez Camacho 2009: 108, fig. 4) partially sclerotized; only both exterior parts of these tergites are completely sclerotized (Fig. 8A, E). This diagnostic character has to be verified carefully, since it has been observed only in two species. In *Remysymphyla spinosa* sp. nov. the second tergite is partially sclerotized (Fig. 9A, E).

Last tergite subelliptical, with posterior margin convex (Figs 8E, F, 10B). In addition, the size of the last tergite is smaller than in *Symphylella* and its shape resembles *Ribautiella*.

Terminal area of cerci smaller than in *Symphylella*, with diagonal striae rather than transversal, pointing back- and inwards (Fig. 8F, 10B). Basis of terminal area also diagonal back- and inwards rather than transversal – as in *Symphylella*. Apical seta also pointing inwards (Fig. 10B, C). The shape of the terminal area of cerci also resembles in some aspects *Ribautiella*. This character has to be observed carefully since it has been inferred from diagrams in the literature (Aubry & Masson 1952a, 1952b; Scheller 1971) and directly observed only in two species.

### Species included

The genus *Remysymphyla* contains only 3 species:

1. *Remysymphyla maura* Aubry & Masson, 1952a, described from Morocco and afterwards reported from the Spanish island of Minorca (Juberthie-Jupeau 1961).
2. *Remysymphyla hova* Aubry & Masson, 1952b, described from Madagascar and then reported again from Madagascar (Rochaix 1956) and from Réunion (Jupeau, 1954)
3. *Remysymphyla hebetocornuta* Scheller, 1971, described from Ceylon.

### Remarks

In addition to the low number of described species of this genus, the material studied and cited in the literature is also very scant. Therefore, the gross incongruence detected between the studied material in this work and the descriptions in the literature – specifically regarding *Remysymphyla hova* – leads the authors to think that the presence of only 15 tergites is a dubious autapomorphy. It was cited for the first time in the definition for the genus (Aubry & Masson 1952a) but it was not accompanied by diagrams or detailed descriptions of this feature, neither in further works on other species. For this reason, the authors draw attention to this feature for future studies on this genus, since the number of tergites has a major role in the systematics and phylogeny of the scolopendrellid symphylans (Edwards 1959; Domínguez Camacho 2009).

*Remysymphyla spinosa* sp. nov.

[urn:lsid:zoobank.org:act:2F1D7455-D3F6-4DC5-A731-04C893267D6A](https://zoobank.org/act:2F1D7455-D3F6-4DC5-A731-04C893267D6A)

Figs 9, 10

### Type material

#### Holotype

Sex unknown, CONGO D.R., Kivu, Itombwe, terr. D'Uvira, tête de source de la Nyalengwe (03°30' S, 029°00' E), in a mountain forest with bamboo, 2500 m, coll. Leleup N., Aug. 1959 (MRAC 22161).

#### Paratypes

2, sex?, same data as holotype (MRAC 22162).

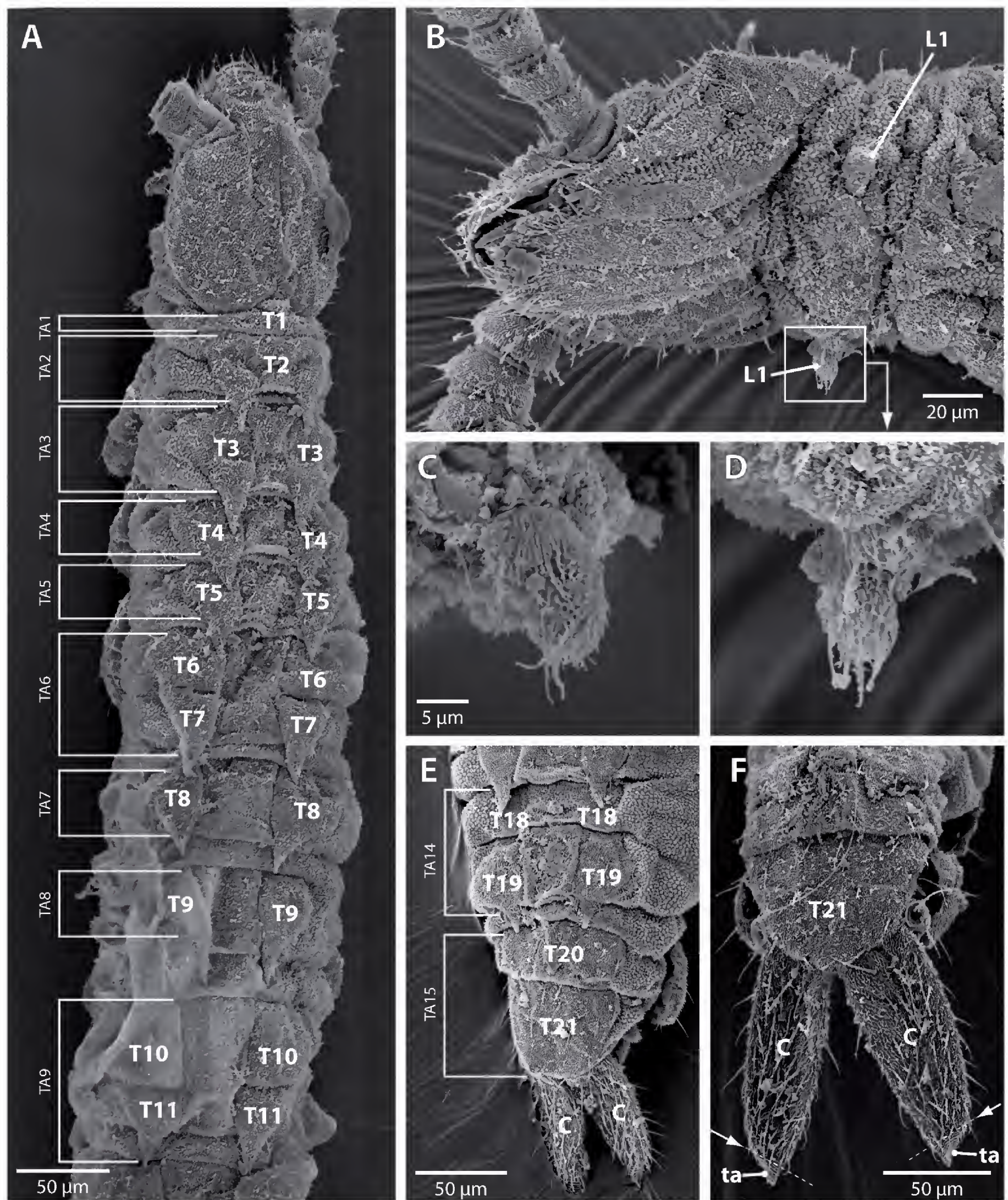


**Fig. 8.** *Remysymphyla hova* Aubry & Masson, 1952. Paratypes (MNHN K002) from Ambanja (A-D) and Ambatolampy (E and F), Madagascar. **A.** Head and anterior half of the trunk, dorsal view. *T1-T11*, tergites 1-11; *TA1-TA9*, tergal areas 1-9 (*vide* Domínguez Camacho 2009, fig. 4, page 108). Doubled labeling of tergites shows partial sclerotization. **B.** Head and first pair of legs, ventral view. **C, D.** Detail of the first leg of two different specimens. **E.** Cerci (*C*) last tergal areas (*TA14*, *TA15*) (*vide* Domínguez Camacho 2009, fig. 4, page 108) corresponding to tergites 18-21 (*T18-T21*), dorsal view. Only exterior parts of tergites 17 and 18 are sclerotized (doubled labeled). **F.** Last tergite (*T21*) and cerci (*C*) of other specimen. Arrows, diagonal basis of the terminal areas (*ta*).

### **Type locality**

CONGO D.R., Kivu, Itombwe, terr. D'Uvira, tête de source de la Nyalengwe (03°30' S, 029°00' E), in a mountain forest with bamboo, 2500 m.

### **Etymology**

The species name is an adjective emphasizing the long and erect setae of the tergites, which give this species a spiny aspect.

### **Description (holotype)**

LENGTH. 2.1 mm.

HEAD. 1.3 times as long as broad with broadest part behind the middle on a level with lateral protuberances (Fig. 9A). Lateral margins nearly straight. Central rod well-developed and not broken. Frontal branches also well-developed. Median branches not very distinct in the holotype, but clearly distinct in the paratypes (Fig. 9B). Dorsal surface with very long and spiny setae of equal length. Cuticle with dense granulation (Fig. 9G).

ANTENNAE. Broken in holotype. Rather short, in paratype left antenna with 27 segments, right with 29, (Fig. 9C). All segments of equal length and pretty broad, 1.8-1.9 times as wide as long. Antennae densely setose, with a spiny appearance; setae erect and long. Longest setae in the inner part of the median segments, with length of 0.5-0.7 times the diameter of segments. Secondary whorl of setae appears in the 6<sup>th</sup>-8<sup>th</sup> segments. Size and number of setae decreases gradually in the seven distal segments, and are totally absent in the last three ones. Apical segment flattened, more than 3 times as wide as long. It presents a transversal depression, bestowing a coffee-bean shape. All segments with pretty long and conspicuous pubescence.

TERGITES. Not all well-visible in the studied specimens, at least 17 can be counted in the holotype, of which 13 present triangular processes (Figs 9A, 10A). All tergites – except the first and the two latest – sclerotized only in the lateral parts. All tergal setae very long; shortest setae at least as long as triangular processes. Triangular processes longer than broad in the anterior tergites, with digitiform ends and no apical setae; processes of the posterior tergites thinner and reduced to small digitiform projections (Fig. 10C). First tergite with six setae arranged in two groups of three. Second tergite comparatively very large (Fig. 9A, E), with five posteromarginal, one central and six lateromarginal setae. Anterolateral setae not longer than the rest. All tergites with pubescence. Last tergite subelliptical, with posterior margin convex (Fig. 10B).

LEGS. First pair of legs reduced to two oviform knobs densely covered by numerous spines (Fig. 9F, H). Two longer setae on the laterals, about twice as long as the whole knob. Last pair of legs with thick and long setae at the distal part of the joints (Fig. 10B, C). Femur and tibia with three setae; tarsus with two protruding dorsal setae. Cuticle pubescent.

STYLI. Small, elongate and spike-like, covered by hairs (Fig. 9D).

CERCI. 2.8 times as long as wide, with straight margins (Fig. 10B, C). About 25 visible setae from the dorsal view, slightly curved and depressed. Cuticle with faint pubescence. Limit between cerci *sensu stricto* and terminal areas not transversal, but diagonal, as a continuation of the outer margin towards the inner margin (Fig. 10B). Terminal area small, 0.1 times as long as the total length of the cerci, conical, longer in the outer margin than in the inner with six diagonal striae, parallel to the basis of the terminal area. Apical seta about as long as terminal areas, curved inwards (Fig. 10B, C).

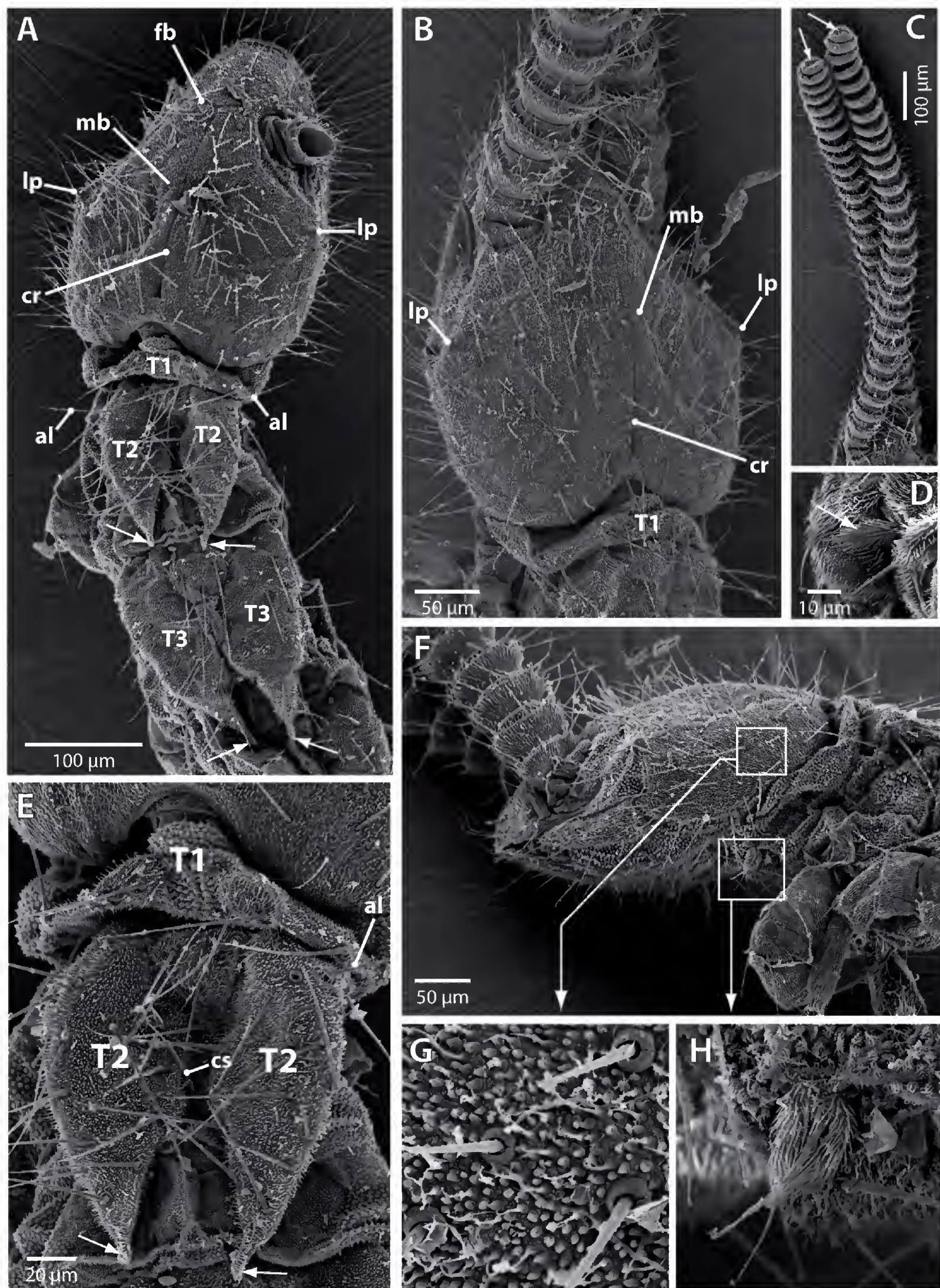


**Fig. 9.** *Remysymphyla spinosa* sp. nov. **A.** Head and first 3 tergites (*T1*, *T2*, *T3*) of holotype, dorsal view. *Arrows*, digitiform end of triangular processes; *al*, anterolateral setae; *cr*, central rod; *fb*, frontal branches; *lp*, lateral protuberance of the head; *mb*, median branches. **B.** Head and first tergite (*T1*) of paratype, dorsal view. *Cr*, central rod; *lp*, lateral protuberance of the head; *mb*, median branches. **C.** Antennae of paratype. *Arrows*, transversal depression of apical segments. **D.** Stylus of the leg 11 (*arrow*) of paratype. **E.** Detail of first (*T1*) and second (*T2*) tergites of holotype. *Arrows*, digitiform end of triangular processes; *al*, anterolateral seta; *cs*, central seta. **F.** Head and first legs of paratype, lateral view. **G.** Detail of the surface of the head of paratype. **H.** Detail of the first leg of paratype.

### Affinities and differential diagnosis

The morphology of the first pair of legs, which does not present evidence of several joints, makes *Remysymphyla spinosa* sp. nov. more similar to *R. hebetocornuta* Scheller, 1971 than to the remaining African species. The spiny aspect of the body is characteristic for this species.

### Remarks

The genus attribution of this species has been problematic, mainly due to the above-explained confusion regarding the definition of *Remysymphyla*. The study of type specimens of *Remysymphyla hova* Aubry & Masson, 1952 allowed the recognition of the first pair of legs of *R. spinosa* sp. nov. as typical for this

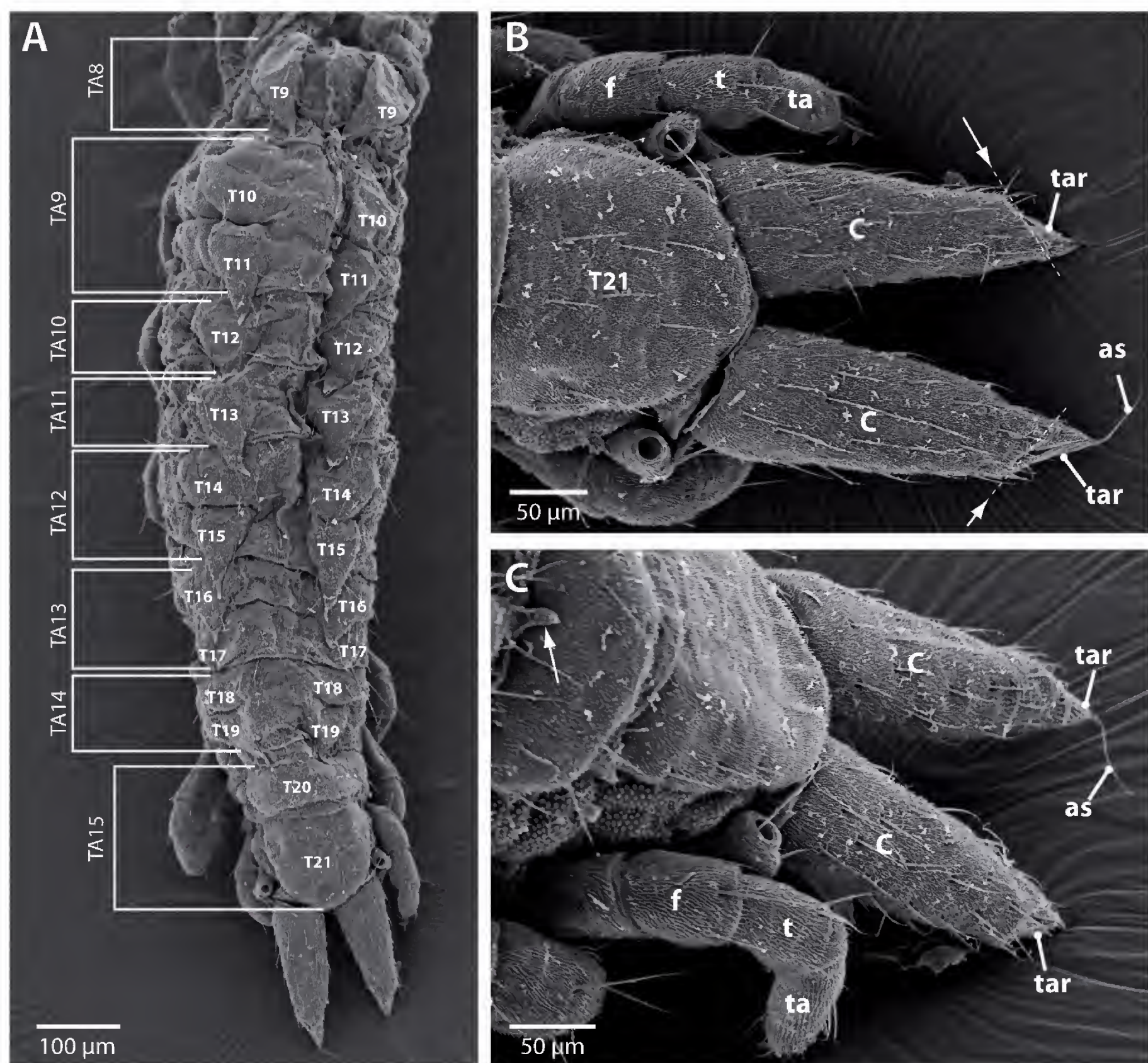


**Fig. 10.** *Remysymphyla spinosa* sp. nov. A. Posterior part of the trunk of the holotype, tegal areas 8-15 (TA8-TA15) (fide Domínguez Camacho 2009: 108, fig. 4), corresponding to tergites 9-21 (T9-T21). Doubled labeling of tergites shows partial sclerotization. B. Last tergite (T21), last pair of legs and cerci (C) of holotype, dorsal view. Arrows, diagonal limit between cerci *sensu stricto* and terminal areas (tar); as, apical seta; f, femur; t, tibia; ta, tarsus of the last right leg. C. Last tergites, last pair of legs and cerci (C) of holotype, lateral view. Arrow, digitiform projection of tergite 19; as, apical seta; f, femur; t, tibia; ta, tarsus of the last left leg; tar, terminal area of the cerci.

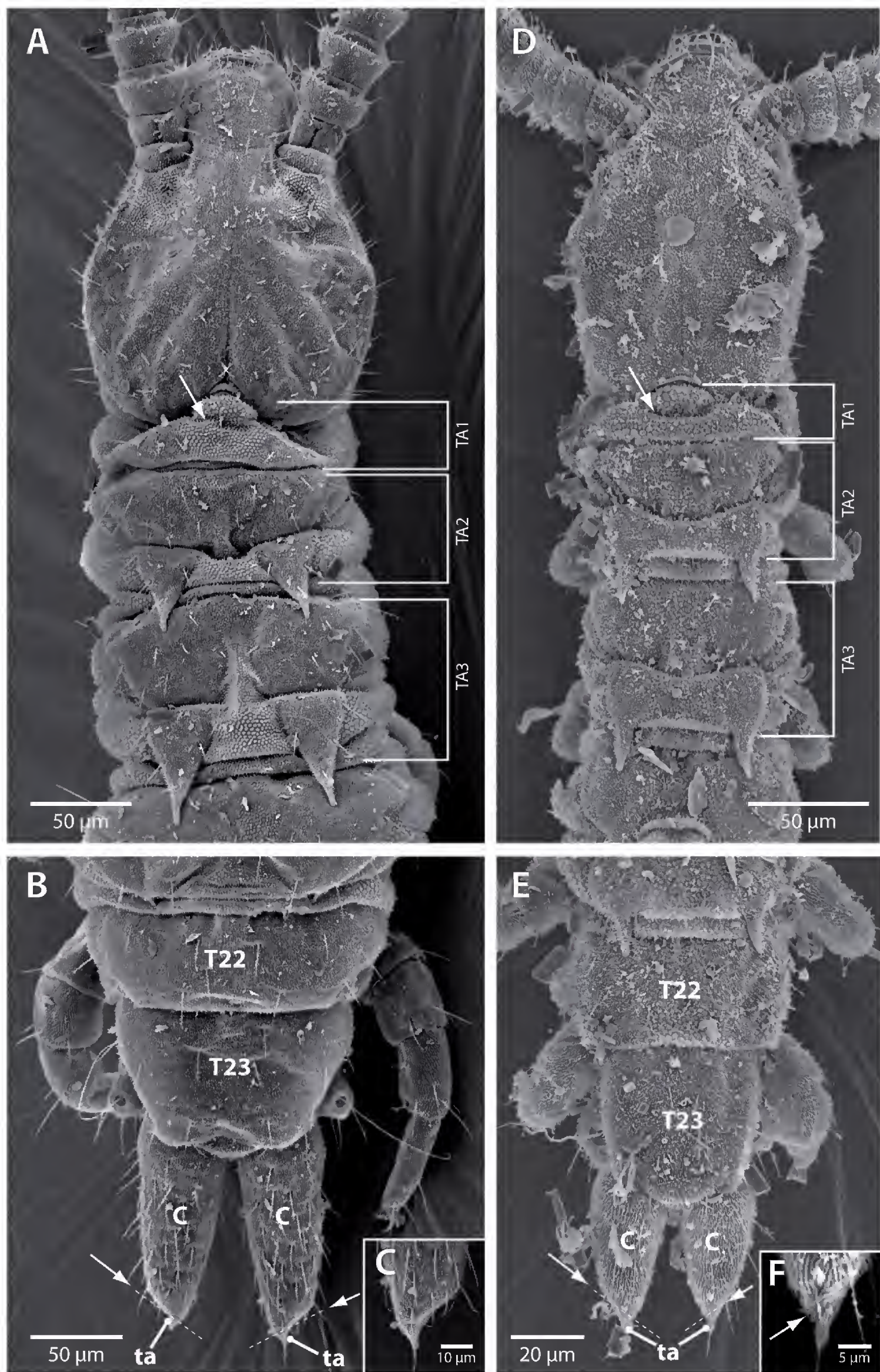


**Fig. 11.** — **A-C.** *Ribautiella zagnanadina* Brölemann, 1926. Museum material (MRAC 7832). — **D-F.** *Ribautiella schoutedeni* Hinschberger, 1954. Museum material (MRAC 6033). — **A, D.** Head and tergal areas 1-3 (TA1-TA3) (fide Domínguez Camacho 2009: 108, fig. 4). Arrows, fold in the first tergite – artefact. **B, E.** Penultimate (T22) and last (T23) tergites, and cerci (C). Arrows, diagonal end of cerci – basis of the terminal areas (ta). **C, F.** Detail of the terminal area of the cerci. Arrow, striae.

genus (Figs 8B-D; 9F, H). However, observations using SEM seems to be suboptimal for detection of one of its major diagnostic characters: the number of joints on the first pair of legs. Although no joints were discernible in this species, the shape of the oviform knobs of *R. spinosa* sp. nov. resembles the two-jointed legs of *R. hebetocornuta* Scheller, 1971.

Genus *Ribautiella* Brölemann, 1926.

#### Type species

*Ribautiella zagnanadina* Brölemann, 1926, described from Benin.

#### Diagnosis

23 tergites, which means that the tergal areas 2, 3, 6, 9, 12, 13, 14 and 15 (*fide* Domínguez Camacho, 2009, fig. 4, page 108) are subdivided into two subtergites; first tergite small, tergites 3, 5-7, 9-11, 13-15, 17, 18 and 21 with paired, triangular posterior processes. In his *Keys to the Genera of Symphyla*, Edwards (1959) mentions the presence of 24 tergites as a diagnostic feature for this genus. This higher number is due to a supposed subdivision of the first tergite. However, this characteristic is questionable since descriptions and illustrations are not satisfactory and this subdivision appears in different grades among the species. The present study using SEM suggests that it is probably an artefact of the mounts for light microscopy (Fig. 11A, D).

First pair of legs reduced either to hairy or spiny knobs or spots. This diagnostic character is also present in *Symphylella*. Accordingly, the combination of the characters 1 and 2 is the strongest diagnostic character set for *Ribautiella*.

Only both exterior parts of the tergites 2-21 completely sclerotized (Fig. 11A, D). This character is also present in other scolopendrellid genera, such as *Scolopendrellopsis*, *Geophilella*, *Parviapiciella* (Domínguez Camacho 2009) and probably *Remysymphyla*.

Terminal area of cerci small, with basis diagonal, pointing back- and inwards rather than transverse (Fig. 11B, E). Striae – if present – also diagonal rather than transverse, pointing back- and inwards (Fig. 11F).

#### Species included

Eight species are known (Scheller 2007): *Ribautiella amazonica* Scheller & Adis, 1984, from Amazonia, South America (Scheller & Adis 1984); *Ribautiella borbonica* Jupeau, 1954, from the island La Réunion (Jupeau 1954) and Madagascar (Rochaix 1956); *Ribautiella cathetus* Scheller, 2007, from Amazonia, South America (Scheller 2007); *Ribautiella delphini* Rochaix, 1956, from Madagascar (Rochaix 1956); *Ribautiella machadoi* Hirschberger, 1954, from Ivory Coast and Angola (Hirschberger 1954; Juberthie-Jupeau 1958); *Ribautiella schoutedeni* Hirschberger, 1954, from Ivory Coast, Angola and the Congo D.R. (Hirschberger 1954; Juberthie-Jupeau 1958); *Ribautiella tuxeni* Allen, 1998, from Amazonia, South America (Allen 1998); *Ribautiella zagnanadina* Brölemann, 1926, from Benin (Brölemann 1926), Angola and Ivory Coast (Hirschberger 1954; Juberthie-Jupeau 1958; Rochaix 1955).

*Ribautiella zagnanadina* Brölemann, 1926

Fig. 11A-C

#### Material examined

2 juveniles with 10 and 11 pairs of legs, CAMEROON, Kounden, 05°42' N, 010°40' E, *Eucalyptus* woodland, coll. Lejeune, Jul.-Aug. 1974; 3 adults, IVORY COAST, Banco, coll. Remy, 20 Apr. 1950 (MRAC 7833).

### Diagnosis

This species is characterised by the presence of many setae on the anterior part of the second tergite (Fig. 11A) and the cerci (Fig. 11B). Additional diagnostic features to distinguish this species from the other one studied here – *Ribautiella schoutedeni* – are the shape of the head, 1.2 times as long as wide (Fig. 11A), the moderate size of the penultimate tergite, 0.6 times as long as the last one, the straighter posterior margin of the last one (Fig. 11B), and the absence of striae on the terminal area of the cerci (Fig. 11C).

***Ribautiella schoutedeni*** Hinschberger, 1954  
Fig. 11D-F

### Material examined

#### Type material

1 paratype, IVORY COAST, Niangbo, coll. Remy, (MRAC 7836); 3 paratypes, ANGOLA, 30 km N of Vila-Luso, coll. Barros-Machado, Jan. 1949 (MRAC 6033).

#### Other material

3 adults and 1 juvenile with 11 pair of legs, CONGO D.R., Shaba, Lubumbashi, 11°40' S, 027°28' E, coll. Goffinet G., Dec. 1969; 1 adult and 1 juvenile with 10 pairs of legs, CONGO D.R., P.N.A., Secteur Ruwenzori, Kibonbole riv., coll. Vanschuytbroeck P., 22 Aug. 1955.

### Diagnosis

Diagnostic characters are the moderate number of setae on the anterior part of the second tergite, the absence of setae on the triangular projections of the anterior tergites (Fig. 11D) and the presence of five striae on the terminal area of the cerci (Fig. 11F). Additional diagnostic features of this species in contrast to *R. zagnanadina* are the narrower head – 1.5 as long as wide (Fig. 11D) – and the larger penultimate tergite – 0.8 times as long as the last one (Fig. 11E).

### Acknowledgements

The authors are grateful to the MRAC for the access to the collection and research infrastructures. Additional specimens for this study were made available by Jean-Jacques Geoffroy (MNHN, Paris). Rudy Jocqué (MRAC), Ulf Scheller and an anonymous reviewer provided numerous comments and ideas which greatly increased the quality of the paper. Gerald Beatty kindly made linguistic corrections to the manuscript. This work was supported by the European Commission's (FP 7) Integrated Infrastructure Initiative program SYNTHESYS (Be-TAF 359).

### References

- Allen R.T. 1998. First record of the genus *Ribautiella* Brolemann in the western hemisphere and key to the species of the world (Symphyla: Scolopendrellidae). *Journal of the New York Entomological Society* 106: 199-208.
- Aubry J. & Masson C. 1952a. Contribution à l'étude de la faune endogée du Maroc. Symphyles. *Bulletin de la Société des Sciences naturelles et physiques du Maroc* 32: 227-234.
- Aubry J. & Masson C. 1952b. Contribution à la faune endogée de Madagascar. Symphyles. *Mémoires de l'Institut Scientifique de Madagascar*, série A 8: 43-66.
- Bagnall R.S. 1913. On the classification of the order Symphyla. *Journal of the Linnean Society (Zoology)* 32: 195-199. <http://dx.doi.org/10.1111/j.1096-3642.1913.tb01775.x>

- Brölemann H.W. 1926. Myriapodes recueillis en Afrique occidentale française par M. l'administrateur en chef L. Duboscq. *Archives de zoologie expérimentale et générale* 65: 1-159.
- Dethier M. 1998. La collection Delhez. 1. Catalogue provisoire. *Bulletin des Chercheurs de la Wallonie* 38: 33-76.
- Dominguez Camacho, M. 2009. Phylogeny of the Symphyla. PhD Thesis, Freie Universität Berlin. [http://www.diss.fu-berlin.de/diss/servlets/MCRFileNodeServlet/FUDISS\\_derivate\\_000000007088/](http://www.diss.fu-berlin.de/diss/servlets/MCRFileNodeServlet/FUDISS_derivate_000000007088/)
- Edwards C.A.T. 1959. Keys to the genera of the Symphyla. *Journal of the Linnean Society of London (Zoology)* 44: 164-169. <http://dx.doi.org/10.1111/j.1096-3642.1959.tb01603.x>
- Edwards C.A.T. & Belfield W. 1967. A new genus and species of Symphyla, *Neosymphyla ghanensis*, with comments on Symphyla segmentation. *Revue d'Ecologie et de Biologie du Sol* 4: 517-521.
- Grassi B. 1886. I progenitori degli insetti e dei miriapodi: morfologia delle scolopendrelle. *Memorie della Reale Accademia delle scienze di Torino*, 2<sup>nd</sup> Series, 37: 593-624.
- Hansen H.J. 1903. The genera and species of the order Symphyla. *Quarterly Journal of Microscopical Science* 47: 1-101.
- Hinschberger M.A. 1954. Symphyles d'Afrique tropicale. *Publicações Culturais, Companhia de Diamantes de Angola* 23: 11-36.
- Juberthie-Jupeau L. 1958. Contribution à l'étude des Symphyles de l'Angola et du Congo Belge. *Publicações Culturais, Companhia de Diamantes de Angola* 38: 93-98.
- Juberthie-Jupeau L. 1961. Biospeleologica LXXX. Faune cavernicole et endogée de l'île de Minorque. Mission H. Coiffait et P. Strinati (1958). 6. Symphyles de Minorque. *Archives de zoologie expérimentale et générale* 99: 273-276.
- Jupeau L. 1954. Symphyles de Nosy-Bé et la Réunion. *Mémoires de l'Institut Scientifique de Madagascar*, série A9: 105-127.
- Ribaut H. 1914. Myriapodes. II. Symphyla. In: Alluaud Ch. & Jeannel R. (eds) *Voyage de Ch. Alluaud et R. Jeannel en Afrique Orientale: 1911-1912. Résultats scientifiques*: 39-48. Librairie Albert Schultz, Paris.
- Rochaix B. 1955. Symphyles d'Afrique tropicale. *Bulletin de l'IFAN* 17: 92-98.
- Rochaix B. 1956. Contribution à l'étude des symphyles de Madagascar. *Mémoires de l'Institut Scientifique de Madagascar* 9: 105-127.
- Scheller U. 1971. Symphyla from Ceylon and Peninsular India. *Entomologica Scandinavica*, Supplement 1: 98-187.
- Scheller U. 1978. The Pauropoda and Symphyla of the Geneva Museum V. A review of the Swiss Scolopendrellidae (Myriapoda, Symphyla). *Revue suisse de zoologie* 85 (2): 247-263.
- Scheller U. 2007. New records of Pauropoda and Symphyla (Myriapoda) from Brazil with description of new species in *Allopauropus*, *Hanseniella* and *Ribautiella* from the northern Pantanal wetland and from Mato Grosso of Brazil. *Amazoniana* 19: 63-75.
- Scheller U. & Adis J. 1984. A new species of *Ribautiella* (Myriapoda, Symphyla, Scolopendrellidae) from an Amazonian black-water inundation forest and note on its natural history and ecology. *Amazoniana* 8: 299-310.
- Silvestri F. 1902. Symphyla, Fascicolo XCVI. In: Berlese A. (ed.) *Acari, Myriopoda et Scorpiones hucusque in Italia reperta*: unpaginated. Padova.

*Manuscript received: 16 February 2012*

*Manuscript accepted: 30 November 2012*

*Published on: 13 December 2012*

*Topic editor: Rudy Jocqué*

Printed versions of all papers are also deposited in the libraries of the institutes that are members of the *EJT* consortium: Muséum National d'Histoire Naturelle, Paris, France; National Botanic Garden of Belgium, Meise, Belgium; Royal Museum for Central Africa, Tervuren, Belgium; Natural History Museum, London, United Kingdom; Royal Belgian Institute of Natural Sciences, Brussels, Belgium; Natural History Museum of Denmark, Copenhagen, Denmark.